NUEXCO

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# NUEXCO REPORT 167
# EXECUTIVE SUMMARY

**Exchange Value Drops $1.25, to $19.25**

The **Exchange Value** as of June 30, 1982 is $19.25 per pound $U_3O_8$. Sellers continued their vigorous competition for the limited business available in the current market.

**Near-Term Supply Increases and Near-Term Demand Declines**

*Active* sellers in the zero to one year time frame are offering 17.8 million pounds $U_3O_8$, up 2.6 million pounds from last month. *Active* uranium demand in the zero to one year time frame decreased by more than 30%, to only 1.1 million pounds $U_3O_8$.

**Supply-Demand Imbalance Aggravated**

Consequently, the ratio of near-term supply to near-term demand increased dramatically from 9.5:1 last month to 16.2:1 this month.

**Transaction Value Declines $1.20 to $21.50**

The **Transaction Value** as of June 30, 1982 is $21.50 per pound $U_3O_8$. It includes eleven transactions totaling 2.6 million pounds $U_3O_8$ and covers a period of four months. **NOTE:** Last month's Executive Summary contained an error in the Transaction Value. It should have reported the Transaction Value as of May 31, 1982 as $22.70, *not* $20.70. Please replace the incorrect copy of June's Executive Summary with the corrected copy enclosed in this Report.

**Six Uranium Sales Reported**

Six uranium sales are reported this month. The total quantity falls in the range of 400 thousand to 1.2 million pounds $U_3O_8$.

**Conversion Value Unchanged at $1.00**

The **Conversion Value** as of June 30, 1982 is $1.00 per pound U as $UF_6$, unchanged from last month. No conversion transactions are reported. Active sellers are offering 4.5 million pounds U in near-term conversion services, while active demand amounts to only 300 thousand pounds U in near-term conversion services.

**Key Lake Partners Reportedly Made Several New Sales**

Canadian sellers' success in tough marketing environment attributed to their willingness to respond to market realities. Nuexco expects selling pressure to ease somewhat, now that much of future output has been committed for sale.

**Production Cost Distributions Presented**

The *Market Analysis* section includes graphs of Nuexco's estimates of the distribution of US and non-US uranium production vs. forward costs of production.

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# NUEXCO

AUGUST 1982 NUMBER 168

# Monthly Report on the Uranium Market

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# MONTHLY REPORT ON THE URANIUM MARKET

August 1982 No. 168

R. WESLEY MILLER, *EDITOR*

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*FOREWORD*

Please note that USDOE will not be holding a Uranium Industry Seminar (customarily held annually in Grand Junction, Colorado) this year.

*MARKET ACTIVITIES*

## PRICING

The **Exchange Value** as of July 31, 1982 is $18.25 per pound $U_3O_8$, down $1.00 from last month's level of $19.25. This decline reflects the continued spirited competition for the few sales opportunities for spot and near-term delivery. As has been the case recently, US utilities liquidating unwanted inventories were the major market factor on the sell side, although some producers were also active.

In last month's Report, *Active* sellers were offering more than 17 million pounds of $U_3O_8$ or equivalent $UF_6$ for sale. Of that amount, roughly half was offered by a single seller who, during July, entered into negotiations involving most of that material and subsequently decided to withdraw the remainder from the market, pending a review of his overall situation. Other sellers were shifted to the *Inactive* category, based on their unwillingness to offer competitive prices. As a consequence of these changes, the ratio of active near-term supply and demand dropped sharply from 16.2:1 a month ago to 2.6:1 this month.

Current buyers include US producers who have elected to buy rather than make, as well as some utilities motivated by the opportunity to acquire material at what they apparently view as bargain prices. Some US utility buyers appear to be of two minds with respect to the current price declines. On the one hand, they express concern about producer shutdowns and the future of the US uranium production industry. On the other hand, they note their obligation to acquire uranium at the lowest possible price, and their inability to justify to their managements or ratemaking bodies the higher prices that producers view as necessary to maintain a viable US industry.

It should be noted that such spot and near-term procurement, if continued, will help redistribute the excess inventories being offered for sale, and provide the basis for eventual price recovery. However, it must also be observed that such redistribution will delay the time when utilities need to make new long-term supply commitments. This delay, in turn, puts increased pressure on existing producers, particularly those whose current delivery commitments are nearing completion.

The **Transaction Value** as of July 31, 1982, is $20.30 per pound $U_3O_8$, down $1.20 from a month ago. The current Transaction Value includes 10 transactions totaling 2.2 million pounds $U_3O_8$ and covers a period of 4 months. The *Market Data* section lists 6 transactions this month.

* * *

The **Conversion Value** as of July 31, 1982, is $1.00 per pound U as $UF_6$, unchanged from last month. Offers to sell conversion services in the near term are well in excess of demand. The market remains quiet with one transaction under negotiation and a few other situations in the early stages of discussion.

* * *

The **Loan Use Charge Rate** remained at six percent. Activity in the loan market is minimal with one large transaction under negotiation and a few smaller transactions in the preliminary phases of discussion.

## AFRICA

Second quarter 1982 production figures from South Africa gold-uranium operations are presented in Table 1.

**Table 1**

**REPUBLIC OF SOUTH AFRICA:**
**Production from Gold-Uranium Operations;**
**Second Quarter 1982**

| Operation | Thousands of Pounds $U_3O_8$ |
|---|---|
| Beisa (St. Helena) | 133 |
| Blyvooruitzicht | 153 |
| Buffelsfontein | 320 |
| CHEMWES | 280 |
| Dreifontein Consolidated | 125 |
| ERGO | 141 |
| Harmony | 326 |
| Hartebeestfontein | 229 |
| J.M.S. | 490 |
| Randfontein | 231 |
| Vaal Reefs | 983 |
| Western Areas | 100 |
| Western Deep Levels | 95 |
| TOTAL: | 3,606 |

Second quarter production increased by approximately two percent over first quarter production.

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*MARKET ACTIVITIES*

Nuexco Report 165 showed total first quarter production from gold-uranium operations of 3.4 million pounds $U_3O_8$. Production figures for the Beisa section of St. Helena were not included in the total because they had not yet been released. A production total of 122,000 pounds $U_3O_8$ has since been announced to bring actual first quarter production to over 3.5 million pounds $U_3O_8$.

First half 1982 uranium production of about seven million pounds $U_3O_8$ is consistent with Nuexco's total 1982 production forecast of over 15 million pounds $U_3O_8$. Overall production during the second quarter 1982 was down about ten percent from the same period of 1981.

The slight production increase over first quarter 1982 levels is mainly due to substantial increases from Vaal Reefs and Western Areas which offset production declines from several other facilities. Overall, most of the gold-uranium producers experienced slight drops in uranium output during the second quarter.

Uranium production at Blyvooruitzicht showed about a seven percent decline from first quarter levels because of a drop in the grade of ore mined. Reduced tonnage from higher grade areas caused decreases in gold grade as well. Blyvooruitzicht has less flexibility to high-grade than most mines, as its higher grade carbon leader ore reserves are being depleted and it is restricted to long wall mining.

J.M.S. production decreased from a first quarter level of 591,000 pounds $U_3O_8$ because of reduced amounts of slime treated in the uranium plant. Randfontein experienced a small decrease in production levels as a result of plant modifications. Randfontein production for the second half of 1982 will probably exceed that of the first. First half production was just under half a million pounds $U_3O_8$.

CHEMWES second-quarter production decreased about 20 percent largely due to lower ore grades and a reduction of tons treated.

The Beisa section of St. Helena continued to be hampered by intersections of water and underground geological faulting, although production was slightly higher in the second quarter. The situation is expected to improve as the section reaches full production levels.

The largest production gains during the second quarter came from Vaal Reefs and Western Areas. As anticipated, the problems at the Vaal Reefs South Uranium plant have been overcome and the plant is now operating at its designed capacity. The amount of material treated increased nearly 20 percent. With a five percent rise in ore grade, the net result was a 30 percent production increase during the quarter.

Because of the depressed market, mining of uranium reserves by Vaal Reefs in the Afrikander lease area has been suspended. The uranium section of the metallurgical plant will be kept on a maintenance (stand-by) basis after its scheduled completion in the third quarter of this year.

A seventy percent increase in uranium production from Western Areas was due to selective mining on the middle Elsburg Reef Horizon. While the amount of ore treated was down 25 percent, a 129 percent increase in ore grade resulted in the substantial production gains.

## AUSTRALIA

The Australian Labor Party (ALP) has recently modified its policy on uranium mining and export in anticipation of the next Federal election, eighteen months away. The complicated and seemingly contradictory language of the new policy allows various interpretations. The one certainty is that the new policy is destined to be no less controversial than the old.

One part of the text reiterates the party's commitment to end uranium mining; another section casts it in terms of an option. In other places the policy falls back into hard-line rhetoric stating that the ALP would allow no new uranium mine development to commence while forming the new government.

Anti-nuclear groups and anti-nuclear party members have labeled the new policy a "nuclear sell-out." They see the ALP's commitment to end uranium mining in Australia reflected in the old platform but not in the new. Even more moderate party supporters have publicly expressed their disdain over the change, although on first reading, the amended policy strongly reaffirms the ALP's opposition to nuclear power and uranium mining.

Senior ministers of the present government have predicted that the new policy would destroy the uranium industry and prevent new export contracts if it were implemented by a Labor government. Thus, the new policy has both caused a rift within the ALP and prompted pre-election posturing by the current government.

The policy would seem to allow existing uranium production to continue while "phasing out" Australian involvement in uranium mining. But it sets conditions which the industry will find almost impossible to meet.

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*MARKET ACTIVITIES*

For example:

1. For any export contract with a French customer, an ALP government would require that France cease all nuclear testing in the Pacific.

2. Any contract for uranium export to Japan would only be considered subject to the Japanese "withdrawing from their intention to dump waste material in the Pacific."

The policy stipulates similarly specific conditions for Finland (no diversion of nuclear material to the USSR); the United Kingdom (no diversion of Australian uranium for military use); and West Germany (no further supply of nuclear technology and equipment to Argentina). The text concludes that the principles of the conditions will be applied to sales contracts for uranium from existing mines with any other country, should the circumstances warrant such a move.

Supporters and opponents of the amendment appear to agree on one point: irrespective of the formidable obstacles the policy raises in terms of the market, the significant point is the freedom given the ALP on the issue. The party is no longer bound to repudiate export contracts and to close uranium mines if elected to power.

The new policy could be construed as paving the way for a change in ALP thinking. This view is supported by one provision stating that an ALP government would consider applications for exports of uranium mined incidentally with other minerals. This point would cover mines such as Roxby Downs where uranium is found in association with copper and gold.

Undoubtedly, the ALP's moderate leadership realizes that uranium mining is no longer a central moral issue for the majority of Australian voters. The present government harshly condemns the ALP's anti-uranium stance in the firm belief that uranium mining and export has the support of most Australians. The ALP's previous hard-line policy was unattractive to the party's leadership, not the least because of the immediate and serious effects its implementation would have on international relations. The new policy can be seen as evidence that the ALP is slowly coming to terms with the reality of uranium mining in Australia.

In the meantime, Australian uranium sales forces will be busy persuading potential buyers against becoming prejudiced towards Australian supply. Their task is difficult. The wording of the new ALP policy may be "too clever" for even the most internationally minded foreign utility.

* * *

Australia's Federal government has given final approval to the Jabiluka development. The Northern Territory government may now grant a mining lease to the joint venture partners (Pancontinental Mining Ltd. 65 percent, and Getty Oil Development Co. 35 percent). The lease is initially valid for 42 years. This announcement follows last week's formal signing of the agreement between the partners and the Aboriginal Land Council on the terms and conditions under which the project can proceed.

* * *

The Roxby Downs copper/gold/uranium deposit is estimated to contain far larger quantities of those minerals than previously assumed. According to figures released by Western Mining (51 percent owner), the estimated amounts of mineralization drilled on a 200 meter grid are: 2000 million tonnes at an average of 1.6 percent copper; 0.6 Kg/tonne of uranium oxide; and 0.6 grams/tonne of gold, commencing 350 M below the surface. Simple arithmetic would convert these figures into the following:

| Mineralization (million tonnes) | Copper (million tonnes) | $U_3O_8$ (million lbs.) | Gold (tonnes) |
|---|---|---|---|
| 2000 | 32 | 2832 | 1200 |

The above figures are staggering. The deposit could contain six times the copper reserves of Australia's largest copper mine at Mt. Isa and twice as much uranium as all known Australian uranium deposits and estimated additional resources combined.

The significance of this deposit is its sheer size. However, its relatively low grade requires a large scale underground operation in order to be viable. Uranium sales will be critical to its viability. Under the indenture bill, the feasibility study for Roxby Downs must be completed by 1984 and a decision to proceed reached three years later.

**EUROPE**

In **Spain**, Iberduero has decided to separate into a new sub-group the 2.2 billion dollars worth of fixed assets it has tied up in the troubled Lemoniz plant. If the plant were to be written off as a loss, Iberduero would be able to obtain tax relief as part settlement in respect of losses from the stoppages at and damages to the plant. It is still likely that the Spanish state or the Basque government

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will be persuaded to take over Lemoniz. The first of the twin 930 MWe units was due to begin operation next year, but that timetable is questionable at this point.

* * *

In **Belgium**, EBES (Sociétés Réunies d'Energie du Bassin de l'Escaut) connected Doel Unit 3 to the grid on June 23. Ordered at the end of 1974, Doel Unit 3 is a PWR of 900 net MWe.

* * *

In **France**, the Taipower President, Mr. Chen Lan-Kao, has declared that negotiations are in progress between Taipower and the French authorities on the storing and reprocessing of spent fuel and waste from Taiwan's American supplied reactors. Other governments are also being contacted.

* * *

In other French developments, low power testing has begun at the 900 MWe Blayais Unit 2. Blayais Unit 1 came into service in May 1981, and Units 3 and 4 are expected to come onstream next year.

On June 26, EdF received official authorization to build Cattenom Units 3 and 4 in the Moselle. Also, the General Council of Loire-Atlantique has pronounced in favor of the Carnet site, 50 kilometers west of Nantes, rather than the site of Rohars. The government will make the final decision between the two sites. EdF put forward the names of these two sites after the local populace rejected the Pellerin site because it was only 35 kilometers from Nantes.

* * *

Agreement in principle was announced by Mr. Edmond Herve, Minister of Energy, to build a plant at Civaux. The initial project involved four units, but this has been reduced to two because the local Information Commission was concerned about the water problems which might ensue from having four units on the site. The public inquiry will be launched in September or October, work should start in 1985, and the plants could be scheduled to come onstream as early as 1991.

The local Information Commission has voted in favor of building Nogent-Sur-Seine Units 3 and 4 in the Aube. the Aube.

There will be a meeting this fall presided over by the Minister of Energy to review the reports given by the local Information Commissions on sites where it is proposed to build plants of over 1000 MWe.

**FAR EAST**

Taipower, the national utility of **Taiwan**, recently announced its government's decision to defer indefinitely the construction of planned Nuclear Units 7 and 8. Units 7 and 8 would have been required if Taiwan's load growth had proceeded as forecast. However, the generally depressed economic conditions have led to lowered forecasts of electric power demand. The deferral of these two units does *not* imply any change in the basic thrust of Taiwan's nuclear power development plans.

The announcement came as no particular surprise. Nuexco's forecasts of uranium consumption published in Report 164 had already anticipated the deferrals of Taiwan Nuclear Units 7 and 8, so the announcement will have no effect on the Nuexco forecast. However, the deferral of the two units does mean that existing uranium supply contracts will suffice for Taipower's needs until late in the decade.

On June 29, Taipower's Kuosheng Unit 2, a BWR of 951 net MWe, generated its first electricity. It will amost certainly enter commercial operations by the end of this year.

* * *

During July, the **People's Republic of China** (PRC) delivered approximately 65,000 pounds $U_3O_8$ to Japan's Power Reactor and Nuclear Fuel Development Corporation (PNC). Although China had exported $U_3O_8$ to other Communist countries before, this delivery was the first PRC export to a non-Communist customer.

It is not yet clear whether this transaction will lead to other commercial uranium dealings between the PRC and non-Communist nations. However, the PRC has previously stated its intention to avoid dealing with South Korea, the USSR, Israel or South Africa, among others.

The material involved in this transaction is scheduled to be converted and enriched at PNC's Ningyo Pass pilot plant and then to be used in mixed oxide fuel for the Fugen test reactor. Because the material was imported for non-commercial use, the transaction was subject to the approval of Japan's Science and Technology Agency. It was also necessary for PNC to obtain an import license from the Ministry of International Trade and Industry (MITI).

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*MARKET ACTIVITIES*

## UNITED STATES

Action taken by three US uranium production companies brought more bad news to the industry.

1. Western Nuclear is suspending operations at both its Ruby Mines in New Mexico and its Sherwood mine and mill in Washington. There will be no further uranium output for the company.
2. Dawn Mining placed its Midnite Mine on standby.
3. Conoco is one of the many major oil companies leaving the mining business altogether and wants to divest itself of its uranium assets. It has one active production operation, its Treviño, Texas *in situ* project.

* * *

Marline Uranium had the mixed blessing of finding 30 million pounds of 0.20 percent average grade uranium in southern Virginia, potentially recoverable using open pit mining methods. The company is evaluating development plans, but under current market conditions, it appears unlikely Marline will be able to bring the find into production in this decade.

* * *

Two nuclear utilities had welcome news this month.

1. Middle South Utilities' Grand Gulf Unit 1, now conducting low power testing, has a good chance to enter commercial operations this year.
2. Just before press time, the NRC voted unanimously to grant a full power operating license for San Onofre Unit 2, managed by Southern California Edison (SCE). SCE's minority partners are San Diego Gas and Electric and two California municipalities, Riverside and Anaheim. The granting of the license is conditional on the utilities' submission, by July 1, 1983, of a study for installing new valves for the purpose of emergency cooling. San Onofre Unit 2, which had already had a fuel loading and low power license, achieved initial criticality on July 26, 1982, and is expected to enter commercial operations this year.

Earlier in the month, the NRC's Atomic Safety and Licensing Board (ASLB) had authorized full power licenses for both San Onofre Unit 2 and Unit 3. SCE expects to receive a fuel loading and low power operating license for San Onofre Unit 3 this year or early next year. If that timetable is met, Unit 3 could enter commercial operations sometime in 1983.

* * *

Public Service of New Hampshire (PSNH) continues its struggle to complete Seabrook Unit 2 on schedule in 1986. New Hampshire's Utilities Commission advised the utility several months ago to stop constructing the unit, at least until Seabrook Unit 1 is finished, indicating it doubts PSNH is capable of handling the financial burden of both units. PSNH has not taken action to comply with the request, so the commission recently announced it will not allow the utility to use funds obtained through public offerings for construction of Seabrook Unit 2. In a report presented to Congress in March of this year, Seabrook Unit 2 was one of 19 nuclear units having construction permits which the NRC staff projected would be cancelled or indefinitely deferred. If construction is stopped, the unit will be very vulnerable to cancellation.

* * *

The US and India have resolved a four-year dispute over fuel for India's two-unit Tarapur power station. Under the terms of the new agreement, announced July 29, the US will allow India to use uranium obtained from France to fuel the two American-built units at Tarapur. The agreement is subject to India's observance of IAEA safeguards. The US has not granted India permission to reprocess the resulting spent fuel; India would need US permission to remove the spent fuel from the reactor site.

The dispute was triggered by India's detonation of a nuclear weapon in 1974. The US had agreed in 1963 to supply the enriched $UF_6$ necessary to operate Tarapur from its startup in 1969 through 1993. However, concerned that India could, by reprocessing the spent fuel from Tarapur, obtain the plutonium necessary for another bomb, in 1978 the US suspended deliveries of nuclear fuel under the terms of the Nuclear Non-Proliferation Act. The US also attempted to use political pressure to induce India to accept IAEA safeguards.

* * *

Nuexco has completed a review, similar to the NRC staff review released in March and discussed in Nuexco Report 164, of US nuclear plants with construction permits. The last such Nuexco reactor analysis was published in Nuexco Report 160 as an essay explaining Nuexco's interpretation of the impact of nuclear reactor cancellations in the United States. That essay analyzed those units officially cancelled between June 1979 and

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June 1981 as well as those units Nuexco projected would be cancelled beyond June 1981.

This most recent Nuexco review of US reactors under construction or on order reached the conclusion that the stream of nuclear unit cancellations has neither stopped nor slowed appreciably. The units Nuexco now expects to be eventually cancelled represent substantial investments by the affected utilities; they were reported as anywhere from four percent to 50 percent complete as of December 31, 1981 (Nuclear News World List of Nuclear Power Plants).

The units summarized in Table 2 were previously included in Nuexco's Apparent Future Consumption calculations; they have not been included in any prior discussion of units Nuexco expected to be cancelled. The estimates of cancelled capacity as well as the lost demand are based on past Nuexco forecasts of commercial operating dates and reactor consumption.

Nuexco's latest forecast, as shown in Table 2, calls for the cancellation of eleven reactors now under construction or on order. Those units represent approximately 15 gigawatts of lost generating capacity between 1989 and 1995. More significantly, uranium demand lost if the forecast is realized will amount to more than 30 million pounds $U_3O_8$ between 1987 and 1995. More than 16 million pounds $U_3O_8$ in lost demand would fall in the years from 1987 to 1991.

**Table 2**

**IMPACT OF FORECAST CANCELLATIONS**

| | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|
| Cancelled GWe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 3.2 | 1.3 |
| Cumulative Cancelled GWe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 4.3 | 5.6 |
| Lost Annual Demand (millions of pounds $U_3O_8$) | 0 | 0 | 0 | 0 | 0 | 0.9 | 3.4 | 2.4 | 6.3 | 3.7 |
| Cumulative Lost Demand (millions of pounds $U_3O_8$) | 0 | 0 | 0 | 0 | 0 | 0.9 | 4.3 | 6.7 | 13.0 | 16.7 |
| Demand as reported in Nuexco Report 164 | 21.3 | 28.2 | 28.5 | 31.4 | 36.0 | 35.6 | 37.1 | 38.2 | 37.7 | 36.1 |
| Adjusted Demand | 21.3 | 28.2 | 28.5 | 31.4 | 36.0 | 34.7 | 33.7 | 35.8 | 31.4 | 32.4 |

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*MARKET DATA*

## URANIUM SUPPLY

| Nuexco Reference Number | Delivery Period[1] (Thousands of Pounds $U_3O_8$) 0 to 1 Year | Beyond 1 Year | Remarks |
|---|---|---|---|
| **Available for Sale:** | | | |
| **ACTIVE** | | | |
| 1575 | | 500 per year | Long Term |
| 1818 | | 250 per year | Long Term |
| 1845 | 160 | | |
| 1900 | 1,150 | | some $UF_6$ |
| 1925 | 500 | | $UF_6$ |
| 1961 | 60 | | |
| 1970 | 70 | | $UF_6$ |
| 1973 | 450 | | |
| 1976 | 180 | | |
| TOTAL: | 2,570 | | |
| **INACTIVE** | | | |
| 1581B | | 150 per year | Long Term |
| 1610 | 150 | | |
| 1664 | 100 | | |
| 1774 | 50 | | |
| 1804 | 615 | | |
| 1805 | | 500 per year | Long Term |
| 1810 | | 750 | |
| 1814 | 250 | | |
| 1877 | 50 | | |
| 1920 | 3,000 | | |
| 1932 | 300 | | |
| TOTAL: | 4,515 | | |

[1] Measured from the date of this Report

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*MARKET DATA*

## URANIUM SUPPLY

| Nuexco Reference Number | Delivery Period[1] (Thousands of Pounds $U_3O_8$) 0 to 1 Year | Beyond 1 Year | Remarks |
|---|---|---|---|
| **Available for Loan:** | | | |
| **ACTIVE** | | | |
| 1742 | 500 | | |
| 1815 | 1,000 | | |
| 1884 | 275 | | |
| 1919 | 3,000 | | |
| 1931 | 600 | | |
| 1932A | 1,000 | | |
| 1938 | 2,000 | | |
| 1939 | 800 | | |
| TOTAL: | 9,175 | | |
| **INACTIVE** | | | |
| 1910 | 1,000 | | |
| TOTAL: | 1,000 | | |
| **Inquiries to Borrow:** | | | |
| **ACTIVE** | | | |
| 1780 | 260 | | |
| TOTAL: | 260 | | |
| **INACTIVE** | | | |
| 1621 | 300 | | |
| TOTAL: | 300 | | |

[1] Measured from the date of this Report

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*MARKET DATA*

## URANIUM DEMAND

| Nuexco Reference Number | Delivery Period[1] (Thousands of Pounds $U_3O_8$) | | Remarks |
|---|---|---|---|
| | 0 to 1 Year | Beyond 1 Year | |
| **Inquiries to Purchase:** | | | |
| **ACTIVE** | | | |
| 1638 | | 300 per year | 1984-89 |
| 1842 | | 500 per year | 2,000 Total |
| 1843 | 320 | 250 | |
| 1871 | | 250 per year | 1983-86 |
| 1915 | | 500 | $UF_6$ |
| 1933 | 160 | | |
| 1945 | | 500 | |
| 1964 | | 500 | |
| 1969 | 50 | | |
| 1975 | 60 | | |
| 1977 | 450 | | |
| TOTAL: | 1,040 | | |
| **INACTIVE** | | | |
| 1410 | | 1,500 per year | 5,000 Total |
| 1459 | | 200 per year | Long Term |
| 1652 | | 200 per year | Long Term |
| 1888 | | 500 per year | Long Term |
| 1923 | 30 | | |
| 1935 | | 400 | |
| 1963 | | 180 | |
| 1966 | 100 | 200 | |
| TOTAL: | 130 | | |

[1]Measured from the date of this Report.

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## CONVERSION SUPPLY

| Nuexco Reference Number | Delivery Period[1] (Thousands of Pounds U as UF6) 0 to 1 Year | Beyond 1 Year | Remarks |
|---|---|---|---|
| **ACTIVE** | | | |
| 1584 | 550 | 300 per year | Long Term |
| 1607 | 600 | | |
| 1609 | 500 | 1,500 per year | Long Term |
| 1886 | 500 | | |
| 1925 | 450 | | |
| 1936 | 200 | 200 per year | Long Term |
| TOTAL: | 2,800 | | |
| **INACTIVE** | | | |
| 1619 | | 300 | |
| 1840 | 300 | | |
| 1902 | | 350 | |
| TOTAL | 300 | | |

## CONVERSION DEMAND

| Nuexco Reference Number | Delivery Period[1] (Thousands of Pounds U as UF6) 0 to 1 Year | Beyond 1 Year | Remarks |
|---|---|---|---|
| **ACTIVE** | | | |
| 1594 | 400 | | |
| 1622 | 250 | 700 | |
| TOTAL: | 650 | | |
| **INACTIVE** | | | |
| 1594 | | 450 per year | Long Term |
| TOTAL: | 0 | | |

[1] Measured from the date of this Report.

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## CURRENT TRANSACTIONS[1]

### Uranium Transactions

| Nuexco Reference Number | Delivery Period | Approximate Quantity (thousands of pounds, $U_3O_8$ equivalent) | Approximate Price as Percent of Current E.V. | Seller | Buyer | Remarks |
|---|---|---|---|---|---|---|
| 1849 | 1982 | less than 50 | 111 | US Producer | Canadian Utility | |
| 1850 | 1983-90 | 1001-2000 | 96 | Canadian Producer | US Utility | |
| 1853 | 1982 | 301-600 | 99 | US Utility | US Utility | |
| 1867 | 1983 | 301-600 | 99 | US Producer | US Producer | |
| 1870 | 1982-87 | 301-600 | 97 | US Producer | US Utility | |
| 1873 | 1982 | less than 50 | 93 | US Producer | US Producer | |

### Conversion Transactions

| Nuexco Reference Number | Delivery Period | Approximate Quantity (thousands of pounds, U equivalent) | Approximate Price as Percent of Current C.V. | Seller | Buyer | Remarks |
|---|---|---|---|---|---|---|

There are no conversion transactions reported this month.

[1] Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.

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## ESTIMATED URANIUM PRODUCTION AND CONSUMPTION: 1970-1980

### Introduction

This Report presents Nuexco's estimates of historical uranium production and consumption for the years 1970-1980. Historical consumption is a theoretical calculation of the actual burnup of uranium in each reactor core in the WOCA countries, with time allowed for the processing of the required uranium through the front end of the fuel cycle. In this context, uranium consumption is defined as:

*The calculated $U_3O_8$ requirements entering the $U_3O_8$/$UF_6$ conversion plant to account for the subsequent burnup achieved in the reactor core at a later time.*

### Methodology

Historical uranium consumption is calculated as a function of:

1. Specific core characteristics of each reactor.
2. Actual tails assay levels which applied to each period of diffusion plant operations.
3. Actual gross electricity generation from each reactor in the period.
4. Annual refueling.
5. Twenty-four month lead time for initial cores and twelve month lead time for reload fuel.

For example, the $U_3O_8$ equivalent of calculated uranium burnup in each reactor's *initial* core load was moved forward two years from time of initial electrical generation to allow for processing time from the $U_3O_8$ form and for start-up testing. Also, the $U_3O_8$ equivalent of calculated uranium burnup associated with each reactor's annual (assumed) *refueling* was moved forward one year from time of restart to also allow for processing time. No allowance for inventory accumulation or depletion appears in the consumption data.

In order to estimate uranium consumption in accordance with the definition stated above, it was first necessary to compile data on the amounts of electricity generated by each reactor in the relevant period. Those results are summarized in Table 3, by broad geographical region. Table 4 shows the same results for each country within the region.

### Results

The results of Nuexco's estimates of uranium consumption are summarized in Table 5, by broad geographical region. Table 6 shows the same results for each country within the region.

The nuclear power generation data in gross terawatt-hours for each nuclear plant (excluding the fast spectrum nuclear plants) for each year were converted into uranium burnup values using appropriate physics and fuel exposure data. Use of the annual generation data effectively includes the actual capacity factor of each plant for each year. Annual refueling was assumed for this time period because it was the predominant refueling interval. Tails assay levels for the enrichment plants were based on the actual levels utilized in each period of diffusion plant operation.

Historical production data for the significant uranium producers in the WOCA countries are shown in Table 7. This data has been compiled from the most reliable sources available, but excludes minor production from Belgium, Brazil, India, Japan, West Germany and similar countries.

### Limitations of Estimates

1. Some caution must be exercised in comparing the above results with other historical data published by Nuexco. For example, Table 5's consumption estimate for the years 1979 and 1980 differs somewhat from estimates of Apparent Future Consumption for those same years published in earlier Monthly Reports. This difference is largely due to the assumption herein that $U_3O_8$ held in storage for future first core usage by nuclear plants long delayed in construction is not included; that material has not been consumed in the reactor to generate power. The earlier Nuexco Reports do include that first core material in the estimated consumption in cases where the delays occur less than two years before forecast dates of commercial operation.

2. The calculation herein has certain limitations in that it does not allow for any deficiency in attaining target fuel exposure and, hence, burnup in each initial core and reload. In the early years of commercial nuclear power development, some quantities of fuel were discharged before reaching target burnup due to fuel performance failures. Also, fuel physics and fuel exposure data used in the above calculation may have differed somewhat from that used in actual core loads due to the frequent "last-minute" changes in enrichment levels and refueling patterns that dominated this period of plant operation.

### Analysis and Implications

Table 8 presents a comparison of historical commercially-utilized WOCA production and consumption of uranium. Table 8 reflects the events of the years 1970-1980.

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**Table 3**

**NUCLEAR GENERATION OF ELECTRICITY: 1970-1980**
**(Total Gross Terawatt-hours or Millions of Megawatt-hours)**

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Europe | 42.7 | 55.9 | 68.3 | 72.6 | 80.1 | 110.2 | 125.2 | 153.0 | 158.9 | 177.9 | 179.7 |
| Far East | 5.2 | 7.2 | 8.6 | 4.6 | 15.9 | 18.4 | 35.0 | 32.6 | 55.9 | 70.2 | 89.1 |
| Other Nations | 0.9 | 10.2 | 13.4 | 16.2 | 19.5 | 18.8 | 24.3 | 31.5 | 38.3 | 44.0 | 46.4 |
| United States | 12.1 | 34.0 | 62.3 | 84.5 | 119.4 | 178.3 | 199.0 | 255.3 | 287.8 | 266.4 | 260.9 |
| TOTAL: | 60.9 | 107.3 | 152.6 | 177.9 | 234.9 | 325.7 | 383.5 | 472.4 | 540.9 | 558.5 | 576.1 |

**Table 4**

**NUCLEAR GENERATION OF ELECTRICITY[1]: 1970-1980**
**(Thousands of Megawatt Hours)**

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Europe** | | | | | | | | | | | |
| Belgium | 0 | 0 | 0 | 0 | 121 | 6,763 | 10,011 | 11,673 | 12,490 | 11,370 | 9,740 |
| Finland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,585 | 4,432 |
| France | 5,272 | 9,593 | 14,048 | 14,174 | 13,674 | 16,893 | 14,729 | 26,109 | 29,212 | 44,861 | 48,527 |
| West Germany | 6,207 | 5,667 | 7,936 | 11,229 | 10,666 | 21,672 | 24,524 | 35,807 | 32,476 | 35,459 | 41,826 |
| Italy | 3,315 | 3,355 | 3,635 | 3,142 | 3,410 | 3,800 | 3,797 | 3,383 | 4,428 | 2,627 | 2,209 |
| Netherlands | 368 | 405 | 526 | 1,038 | 3,349 | 3,335 | 3,872 | 3,710 | 4,060 | 3,489 | 4,200 |
| Spain | 1,007 | 2,440 | 4,751 | 6,545 | 7,223 | 7,544 | 7,555 | 6,525 | 7,649 | 6,700 | 5,185 |
| Sweden | 0 | 60 | 1,417 | 2,054 | 2,038 | 12,021 | 15,992 | 19,890 | 23,781 | 21,039 | 24,086 |
| Switzerland | 0 | 1,903 | 4,915 | 6,192 | 6,863 | 7,721 | 7,900 | 8,070 | 8,349 | 11,848 | 8,672 |
| United Kingdom | 26,524 | 32,443 | 31,101 | 28,238 | 32,717 | 30,467 | 36,842 | 37,805 | 36,491 | 36,875 | 30,858 |
| Europe TOTAL: | 42,693 | 55,866 | 68,329 | 72,612 | 80,061 | 110,216 | 125,222 | 152,972 | 158,936 | 177,853 | 179,735 |
| **Far East** | | | | | | | | | | | |
| Japan | 5,173 | 7,229 | 8,595 | 4,562 | 15,944 | 18,356 | 35,029 | 32,525 | 50,915 | 60,683 | 77,755 |
| Korea | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,324 | 3,152 | 3,177 |
| Taiwan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99 | 2,670 | 6,329 | 8,199 |
| Far East TOTAL: | 5,173 | 7,229 | 8,595 | 4,562 | 15,944 | 18,356 | 35,029 | 32,624 | 55,909 | 70,164 | 89,131 |
| **Other Nations** | | | | | | | | | | | |
| Argentina | 0 | 0 | 0 | 0 | 1,036 | 2,517 | 2,572 | 1,637 | 2,895 | 2,692 | 2,340 |
| Canada | 919 | 10,247 | 7,552 | 14,285 | 15,410 | 13,242 | 18,016 | 26,764 | 32,925 | 38,383 | 40,372 |
| India | 0 | 0 | 5,624 | 1,936 | 2,475 | 2,514 | 3,194 | 2,779 | 2,264 | 2,924 | 2,842 |
| Pakistan | 0 | 2 | 233 | 0 | 584 | 546 | 487 | 338 | 229 | 35 | 839 |
| Other Nations TOTAL: | 919 | 10,249 | 13,409 | 16,221 | 19,505 | 18,819 | 24,269 | 31,518 | 38,313 | 44,034 | 46,393 |
| **United States** | 12,117 | 33,967 | 62,307 | 84,481 | 119,422 | 178,260 | 198,963 | 255,253 | 287,772 | 266,411 | 260,905 |
| Free World TOTAL: | 60,902 | 107,311 | 152,640 | 177,876 | 234,932 | 325,651 | 383,483 | 472,367 | 540,930 | 558,462 | 576,164 |

[1]McGraw-Hill, Inc.; New York, N.Y.; "Nucleonics Week"

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**Table 5**

**ESTIMATED URANIUM CONSUMPTION: 1970-1980**
**(Millions of Pounds $U_3O_8$ Equivalent)**

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Europe | 10.3 | 6.6 | 8.5 | 13.2 | 13.5 | 15.0 | 17.6 | 19.8 | 21.9 | 26.5 | 35.7 |
| Far East | 0.9 | 0.6 | 3.5 | 1.9 | 3.9 | 2.0 | 9.6 | 5.7 | 3.7 | 4.8 | 8.5 |
| Other Nations | 0.6 | 0.7 | 0.8 | 0.8 | 1.0 | 1.6 | 1.6 | 1.9 | 2.0 | 2.4 | 3.7 |
| United States | 7.0 | 9.8 | 17.0 | 12.8 | 13.0 | 18.3 | 17.3 | 16.0 | 18.9 | 21.1 | 20.7 |
| TOTAL: | 18.8 | 17.7 | 29.8 | 28.7 | 31.4 | 36.9 | 46.1 | 43.4 | 46.5 | 54.8 | 68.6 |

**Table 6**

**ESTIMATED URANIUM CONSUMPTION**
**(Thousands of Pounds $U_3O_8$)**

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Europe** | | | | | | | | | | | |
| Belgium | 0 | 0 | 0 | 1,739 | 0 | 423 | 630 | 726 | 777 | 713 | 2,696 |
| Finland[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 864 | 0 | 217 | 1,132 |
| France[2] | 1,485 | 1,094 | 1,576 | 1,592 | 1,587 | 2,763 | 4,379 | 3,645 | 7,036 | 10,257 | 8,047 |
| Italy | 426 | 399 | 458 | 370 | 419 | 464 | 1,644 | 423 | 525 | 290 | 241 |
| Netherlands | 38 | 545 | 54 | 82 | 231 | 234 | 270 | 258 | 283 | 245 | 292 |
| Spain | 1,412 | 313 | 473 | 619 | 699 | 726 | 721 | 669 | 716 | 1,542 | 1,444 |
| Sweden | 950 | 0 | 1,045 | 1,882 | 1,463 | 1,390 | 1,353 | 1,838 | 3,375 | 4,346 | 3,617 |
| Switzerland | 976 | 114 | 928 | 1,843 | 1,776 | 2,182 | 2,202 | 3,126 | 2,312 | 2,514 | 2,659 |
| United Kingdom[3] | 2,840 | 3,745 | 3,442 | 3,075 | 5,891 | 3,304 | 4,022 | 4,884 | 3,893 | 4,177 | 10,612 |
| West Germany | 2,180 | 404 | 529 | 1,963 | 1,469 | 3,540 | 2,391 | 3,407 | 3,001 | 2,196 | 4,013 |
| Yugoslavia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 898 |
| Europe TOTAL: | 10,307 | 6,614 | 8,505 | 13,165 | 13,535 | 15,026 | 17,612 | 19,840 | 21,918 | 26,497 | 35,651 |
| **Far East** | | | | | | | | | | | |
| Japan | 842 | 585 | 3,474 | 1,904 | 3,862 | 1,969 | 8,299 | 5,052 | 3,382 | 4,299 | 6,533 |
| Korea | 0 | 0 | 0 | 0 | 0 | 0 | 631 | 0 | 132 | 179 | 562 |
| Taiwan | 0 | 0 | 0 | 0 | 0 | 0 | 641 | 641 | 158 | 377 | 1,456 |
| Far East TOTAL: | 842 | 585 | 3,474 | 1,904 | 3,862 | 1,969 | 9,571 | 5,693 | 3,672 | 4,855 | 8,551 |
| **Other Nations** | | | | | | | | | | | |
| Argentina | 0 | 0 | 102 | 0 | 69 | 169 | 172 | 110 | 194 | 180 | 157 |
| Brazil | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 203 |
| Canada | 534 | 507 | 372 | 706 | 761 | 1,272 | 1,182 | 1,591 | 1,619 | 1,904 | 2,941 |
| India | 0 | 148 | 380 | 132 | 173 | 175 | 221 | 191 | 155 | 292 | 347 |
| Pakistan | 91 | 0 | 13 | 0 | 32 | 30 | 26 | 18 | 12 | 2 | 46 |
| Other Nations TOTAL: | 625 | 655 | 867 | 838 | 1,035 | 1,646 | 1,601 | 1,910 | 1,980 | 2,378 | 3,694 |
| **United States[4]** | 7,038 | 9,815 | 16,996 | 12,807 | 12,961 | 18,294 | 17,344 | 15,964 | 18,968 | 21,060 | 20,727 |
| Free World TOTAL: | 18,812 | 17,669 | 29,842 | 28,714 | 31,393 | 36,935 | 46,128 | 43,407 | 46,538 | 54,790 | 68,623 |

[1]Excludes 2 Russian Reactors
[2]Excludes Phoenix, Creys-Malville
[3]Excludes Dounreay
[4]Excludes Shippingport & Hanford

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1. Substantial inventory accumulation occurred in the early 1970s, when utilities and other users were building inventories with low-priced material.

2. In the mid-1970s, consumption and desired inventory buildup were rising without comparable expansion of production, such that inventory accumulation was limited and prices were rising.

3. In the latter part of the period, production was again well in excess of consumption and desired inventory buildup, and prices fell to less than half their prior peak levels.

Table 8 can be summarized with cumulative totals (in millions of pounds $U_3O_8$):

| | | |
|---|---|---|
| Cumulative production, | 1970-1980 | 733 |
| Cumulative consumption, | 1970-1980 | 422 |
| Inventory accumulation, | 1970-1980 | 311 |

That inventory amount compares with a 1981 WOCA beginning inventory of 368 million pounds $U_3O_8$ published in Report 159. The difference is largely attributable to inventory on hand at the beginning of 1970, although certain changes in assumptions in the theoretical calculation of consumption in the Nuexco model may also account for some portion of the difference.

**Table 7**

**WOCA URANIUM PRODUCTION: 1970-1980**
**(Millions of Pounds $U_3O_8$)**

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Argentina | 0.12 | 0.12 | 0.07 | 0.12 | 0.13 | 0.06 | 0.10 | 0.26 | 0.33 | 0.31 | 0.49 |
| Australia | 0.66 | 0 | 0 | 0 | 0 | 0 | 0.93 | 0.93 | 1.34 | 1.83 | 4.06 |
| Canada | 9.16 | 9.96 | 10.40 | 9.65 | 8.89 | 9.13 | 12.6 | 15.05 | 17.69 | 17.80 | 18.58 |
| France | 3.26 | 3.26 | 3.59 | 3.94 | 4.19 | 4.50 | 4.87 | 5.45 | 5.68 | 5.95 | 6.85 |
| Gabon | 1.04 | 1.40 | 0.55 | 1.05 | 1.13 | 2.08 | 2.51 | 2.36 | 2.66 | 2.86 | 2.69 |
| Namibia | 0 | 0 | 0 | 0 | 0 | 0 | 1.70 | 6.08 | 7.01 | 11.02 | 10.50 |
| Niger | 0 | 1.12 | 2.26 | 2.60 | 3.25 | 3.40 | 3.80 | 4.19 | 5.36 | 9.20 | 10.73 |
| Portugal | 0.17 | 0.15 | 0.19 | 0.19 | 0.24 | 0.30 | 0.23 | 0.25 | 0.25 | 0.30 | 0.21 |
| South Africa | 8.23 | 8.37 | 8.00 | 7.11 | 7.05 | 6.47 | 7.17 | 8.74 | 10.30 | 12.50 | 15.98 |
| Spain | 0.13 | 0.16 | 0.16 | 0.17 | 0.16 | 0.35 | 0.44 | 0.47 | 0.50 | 0.52 | 0.52 |
| United States | 25.8 | 24.6 | 25.8 | 26.5 | 22.9 | 23.1 | 25.5 | 29.9 | 36.9 | 37.6 | 43.7 |
| TOTAL: | 48.6 | 49.1 | 51.0 | 51.3 | 47.9 | 49.4 | 59.8 | 73.7 | 88.0 | 99.9 | 114.3 |

**Table 8**

**WOCA URANIUM PRODUCTION VS. CONSUMPTION: 1970-1980**
**(In Millions of Pounds $U_3O_8$ Equivalent)**

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Production[1] | 49 | 49 | 51 | 51 | 48 | 49 | 60 | 74 | 88 | 100 | 114 |
| Consumption[2] | 19 | 18 | 30 | 29 | 31 | 37 | 46 | 43 | 46 | 54 | 69 |
| Addition to Inventory | 30 | 31 | 21 | 22 | 17 | 12 | 14 | 31 | 42 | 46 | 45 |

[1]This Report, Table 7 (rounded to nearest million).
[2]This Report, Table 5 (rounded to nearest million).

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## URANIUM RESOURCES

### Introduction

Steadily rising production costs and declining market prices have combined to reduce Nuexco's estimate of Free World reasonably assured resources (RAR) from approximately 1,450,000 tonnes $U_3O_8$ in July 1981 (Report 155) to 636,000 tonnes $U_3O_8$ as of this Report. A reduction was to be expected, but the magnitude of reduction outlined in this Report might come as a surprise to some. The current estimate is less than 44 percent of that published thirteen months ago.

### Methodology

The Nuexco estimate of RAR published in Report 155 was based on the definitions accepted by the International Atomic Energy Agency (IAEA) and the Organization for Economic Cooperation and Development (OECD). RAR are defined by IAEA/OECD as:

> "uranium that occurs in known mineral deposits which can be recovered within a production cost range of less than US $30 per pound $U_3O_8$, with currently proven mining and processing technology."

The IAEA/OECD further defines RAR as having a high assurance of existence within the specified cost range. RAR so classified are considered as ore reserves, which is consistent with the USDOE classification for ore reserves.

Declining market prices have called into question the generally-accepted IAEA/OECD cost interval of less than $30 per pound $U_3O_8$. Therefore, Nuexco has reevaluated, based on procedures accepted by the IAEA/OECD, Free World RAR available at a forward production cost below US $20 per pound $U_3O_8$. Both IAEA/OECD and USDOE define forward production cost as:

> "all capital and operating expenditures incurred after the date of the ore reserve estimate. Sunk costs are not included."

By either definition, a substantial percentage of uranium resources known to exist in the Free World could not be produced profitably at current price levels. However, that is not to say that higher cost production will not continue to be available. For example, under such special circumstances as favorable forward sales contracts or government sponsored production programs, production operations having average costs double or triple current market price can sometimes continue to operate profitably.

The current Nuexco estimate yielded a sharp decrease of reserves in every uranium resource country except South Africa. In all cases, however, uranium resources have shifted into higher cost categories according to ore grade and newly assigned recovery economics. The estimate of less than $20 by Nuexco is considered to be a reasonable cost cutoff for RAR even though the market level is currently lower. The primary influence over present market activity is inventory selling. Only a limited number of existing producers will be able to sustain production under such circumstances, especially in the US. Present production capability will diminish rapidly and planned production centers could be delayed indefinitely. The duration of the situation is uncertain; therefore, RAR at a cost of less than $20 per pound may become the accepted level where property development and marketing activity will stabilize during the period of uncertainty.

Table 9 presents the Nuexco estimate of RAR available at a forward cost cutoff of $20 or less per pound $U_3O_8$. The estimate for the four principal uranium resource countries of Australia, Canada, South Africa and the United States is primarily based on public information. Nuexco has used its best judgment to adjust the RAR to the $20 forward cost category. An RAR summary for the rest of the Free World is included in the table; however, the estimated RAR is considered to be less reliable by Nuexco due to the scarcity of available information. Table 9 also shows, for comparison, the IAEA/OECD estimate of RAR as of January 1, 1981. The Nuexco estimate for the Free World is less than half that of the IAEA/OECD.

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**Table 9**

**FREE WORLD URANIUM RESOURCES REASONABLY ASSURED AT FORWARD COSTS BELOW US$20 PER POUND $U_3O_8$**

| Country | Nuexco Estimate 7/1/82 (Tonnes $U_3O_8$) | Percent of Total | IAEA/OECD Estimate 1/1/82 (Tonnes $U_3O_8$) | Percent of Total |
|---|---|---|---|---|
| Australia | 118,000 | 19 | 347,000 | 26 |
| Canada | 142,000 | 22 | 271,000[1] | 20 |
| South Africa | 287,000 | 45 | 291,000 | 21 |
| United States | 15,000 | 2 | 186,000[2] | 14 |
| Subtotal: | 562,000 | 88 | 1,095,000 | 81 |
| France | 14,000 | 2 | 70,000 | 5 |
| Niger | 60,000 | 10 | 189,000 | 14 |
| TOTAL: | 636,000 | 100 | 1,354,000 | 100 |

[1] Measured and Indicated reserves minable at a price below $135/kg U as estimated by the Canadian Department of Energy, Mines and Resources.
[2] US DOE estimate dated 1/1/82; the estimate excludes certain ore deposits in early stages of development planning.

**Australia**

The majority of uranium resources in Australia have been reclassified by Nuexco into higher cost categories. The Nuexco estimate of 118,000 tonnes $U_3O_8$ as RAR is approximately one-third of the IAEA/OECD estimate. Government export policies and political uncertainties have contributed directly to project delays and escalating recovery costs. Considering the state of the uranium market in general, and Australian government policies in particular, the potential Australian producer, for all practical purposes, has been priced out of the world market.

The only RAR at below $20 per pound are included in the Ranger and Nabarlek deposits. Both projects are in production and operating at a forward cost level below $20 per pound by Nuexco's estimate. It is doubtful if any other project, including the planned in situ leach projects, could come into the market below $20 considering financial costs plus other uncertainties. The possibility exists that uranium could be produced at competitive levels as a co-product to gold at Jabiluka and to copper at Olympic Dam; however, start-up of either project remains questionable because depressed prices of the companion metals compound the problems connected with uranium.

**Canada**

Nuexco's estimate of RAR at $20 or less is 142,000 tonnes $U_3O_8$, 48 percent less than the IAEA/OECD estimate. All RAR are limited to deposits at Cluff Lake, Rabbit Lake, Collins Bay and Key Lake. The deposits are already producing or under development. Each deposit contains high-grade reserves that will be mined by open pit methods. This combination plus favorable governmental policies has allowed each producer to market $U_3O_8$ based on market-priced contracts with an appropriate floor price, and thereby gain a competitive edge over many existing producers and most potential producers.

All other uranium resources in Canada, including Midwest Lake, are reclassified into higher cost categories. Primarily, the reclassification includes the reserves at Elliot Lake which represents the largest ongoing production capacity in Canada. All mines in the Elliot Lake district are operating above the $20 level. Even so, the mines are scheduled to continue operating to supply approximately 84,000 tonnes $U_3O_8$ to Ontario Hydro through the years 1980-2020. Remaining RAR throughout Canada to be reclassified includes resources at Beaverlodge, Madawaska and Agnew Lake. Each mine has recently ceased operating due to high costs.

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Another 5,000 to 10,000 tonnes $U_3O_8$ in small deposits scattered throughout Canada are also reclassified into a higher cost category.

**South Africa**

Nuexco's estimate of RAR in South Africa is essentially unchanged at 287,000 tonnes $U_3O_8$ compared to 291,000 tonnes included in the IAEA/OECD estimate. Approximately 3500 tonnes $U_3O_8$ associated with Karoo sediments is the only material to be reclassified into a higher cost category. The quartz-pebble conglomerates in the Witwatersrand district remain as the main source of RAR. An estimated 85 percent of uranium available in the $20 or less category is associated with gold in the conglomerates. Tailings in the same district account for another 14 percent. The remaining one percent is being recovered as a by-product to copper at the Palabora operation located in the Northern Transvaal.

The recovery of gold and uranium in South Africa is adapted to low-grade, high volume operations which require efficient, low-cost control. Nuexco's estimate of production costs allocated to uranium is within the band of $20 or less per pound $U_3O_8$, both for newly mined ore and the recovery from tailings. It is Nuexco's judgment that because South African RAR is associated with the gold, total availability will remain high and South Africa will continue to be one of the largest uranium resource countries in the Free World.

**United States**

Nuexco's estimate of RAR for the US is based on figures released by the USDOE as of January 1, 1982 as modified by information gained in Nuexco studies of uranium production costs. The RAR figure used by IAEA/OECD is outdated one year. DOE reclassified all RAR in the previously accepted category of $15 or less into the $30 or less category. The new RAR at $30 or less estimated by DOE is 186,000 tonnes $U_3O_8$ compared to 426,000 tonnes as of January 1, 1981, a decrease of 56 percent. Nuexco's current estimate of RAR at the $20 or less per pound is about 15,000 tonnes $U_3O_8$, an amount less than ten percent of the latest DOE estimate for the $30 or less category. The US can no longer be considered a major uranium resource country under existing circumstances.

Uranium reserves in the US exist primarily in low-grade deposits. DOE estimates the average grade of ore remaining in the $30 classification at 0.19 percent $U_3O_8$ compared to 0.21 percent in 1981. The reclassification of RAR into higher cost categories is a product of lower ore grades and escalating production costs. Only a few US producers are competitive in the present uranium market. The majority have been forced to curtail or cancel operations. Others have elected to buy uranium concentrate in the marketplace to fill contracts rather than to continue to produce at a loss.

RAR at less than $20 will continue to decrease, but probably at a slower rate. The effect of additional changes in the market price and escalating production costs will be minimized; however, the added pressure on producers could lead to high-grading certain orebodies. Should high-grading occur, RAR for the US could drop to about 8,000 or 10,000 tonnes $U_3O_8$ within the next two to three years.

**Remaining Free World**

France and Niger are the only other countries considered to have RAR in the cost category of less than $20 per pound. Reliability of information is less certain, but Nuexco estimates that France has about 14,000 tonnes $U_3O_8$ available. Niger has an estimated 60,000 tonnes in the lower cost category. Nuexco computed the current estimate of RAR by first reducing the 1981 estimate by 10 percent to account for escalating production costs and then subtracting actual 1981 production. Nuexco assumed no additional resources were delineated. France produced approximately 2,500 tonnes $U_3O_8$ in 1981; Niger produced approximately 5,800 tonnes.

The RAR of Namibia and Gabon have been reclassified into a higher cost category for the first time by Nuexco. One year ago RAR at $25 or less per pound totaled 90,000 tonnes for Namibia and 24,000 tonnes for Gabon (see Report 155). Nuexco estimates that production costs of both operations now exceed the $20 category; even so, production will probably continue, since almost all production in each country is committed to long-term, higher-priced contracts.

There are no other countries with important uranium resources that, in Nuexco's estimation, could be produced at a cost of $20 or less per pound $U_3O_8$. Uranium available to the Free World in the current market environment is, therefore, estimated at approximately 636,000 tonnes $U_3O_8$. A turnaround in the supply/demand situation for the industry will be necessary before RAR will return to a higher availability level.

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*STATISTICAL DATA*

**EXCHANGE VALUE $18.25/lb. $U_3O_8$**
Determined as of July 31, 1982

**Definition**[1]

The Exchange Value is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the last day of the month.

**Derivation**

Nuexco bases the Exchange Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

**Comments**

Nuexco does not consider the following in determining the Exchange Value:

A. The price of uranium delivered or to be delivered under old contracts.
B. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.

[1]In December, 1981, Nuexco published a history of the Exchange Value which chronicled, month-by-month, changes in its definition, usage and derivation. Copies are available upon request.

**TRANSACTION VALUE**[2]
Determined as of July 31, 1982

| $/lb. $U_3O_8$ | Millions of Pounds | Number of Transactions | Number of Months |
|---|---|---|---|
| 20.30 | 2.2 | 10 | 4 |

**Definition**

The Transaction Value is a weighted average price of recent transactions, and is based on prices paid for $U_3O_8$ in transactions closed within the previous three-month period and for which delivery was scheduled within one year of the transaction date. At least ten transactions totaling at least two million pounds $U_3O_8$ are included in each calculation, or the sample time is extended as necessary to include these minima. Foreign currencies are converted to US dollars as of the transaction date.

[2]Transaction Values for 1976 through 1981 and their associated parameters (millions of pounds, number of transactions and number of months) are tabulated on pages 31 and 32 of Report 161.

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*STATISTICAL DATA*

## EXCHANGE AND TRANSACTION VALUES
## SINCE JANUARY 1978
Determined as of the last day of the month indicated

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*STATISTICAL DATA*

## HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. $U_3O_8$)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1968 | — | — | — | — | — | — | — | 6.35 | 6.35 | 6.40 | 6.45 | 6.50 |
| 1969 | — | 6.35 | 6.10 | 6.10 | 6.25 | 6.25 | 6.20 | 6.20 | 6.15 | 6.15 | 6.15 | 6.20 |
| 1970 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.30 | 6.20 | 6.15 | 6.15 | 6.15 | 6.15 |
| 1971 | 6.20 | 6.20 | 6.20 | 6.20 | 6.15 | 6.05 | 6.00 | 5.95 | 5.95 | 5.95 | 5.95 | 5.95 |
| 1972 | 5.95 | 5.95 | 5.95 | 5.95 | 5.95 | 5.95 | 5.95 | 5.95 | 5.95 | 5.95 | 5.95 | 5.95 |
| 1973 | 5.95 | 6.00 | 6.10 | 6.20 | 6.45 | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 | 6.75 | 7.00 |
| 1974 | 7.70 | 7.90 | 8.00 | 9.00 | 9.50 | 10.50 | 11.50 | 12.00 | 12.50 | 14.00 | 14.75 | 15.00 |
| 1975 | 16.00 | 16.00 | 18.00 | 20.00 | 21.00 | 23.00 | 24.70 | 26.00 | 26.00 | 28.50 | 30.00 | 35.00 |
| 1976 | 35.20 | 37.00 | 39.25 | 40.00 | 40.00 | 40.00 | 40.00 | 40.40 | 41.00 | 41.00 | 41.50 | 41.00 |
| 1977 | 41.35 | 41.50 | 41.60 | 41.60 | 42.00 | 42.25 | 42.25 | 42.25 | 42.40 | 42.75 | 43.20 | 43.20 |
| 1978 | 42.90 | 43.25 | 43.25 | 43.25 | 43.40 | 43.40 | 43.40 | 43.10 | 43.25 | 43.00 | 43.25 | 43.25 |
| 1979 | 43.25 | 43.25 | 43.25 | 43.25 | 43.25 | 43.00 | 42.70 | 42.70 | 42.20 | 42.20 | 41.00 | 40.75 |
| 1980 | 40.00 | 38.00 | 35.00 | 32.00 | 32.00 | 31.50 | 31.50 | 30.00 | 28.50 | 28.00 | 28.00 | 27.00 |
| 1981 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 24.25 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 |
| 1982 | 23.00 | 23.00 | 22.50 | 20.75 | 20.50 | 19.25 | 18.25 | | | | | |

## HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. $U_3O_8$)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1976 | — | — | — | — | 39.60 | 39.70 | 39.70 | 40.40 | 40.30 | 40.60 | 40.70 | 40.70 |
| 1977 | 41.30 | 41.30 | 41.40 | 41.50 | 42.80 | 42.90 | 43.00 | 42.60 | 42.50 | 42.80 | 42.90 | 42.90 |
| 1978 | 43.10 | 43.30 | 43.70 | 43.60 | 43.60 | 43.20 | 43.30 | 43.40 | 43.40 | 43.60 | 43.40 | 43.70 |
| 1979 | 43.60 | 43.80 | 43.70 | 43.40 | 43.60 | 43.70 | 43.70 | 43.60 | 43.60 | 43.60 | 43.50 | 42.30 |
| 1980 | 42.00 | 39.30 | 38.60 | 38.40 | 37.90 | 37.60 | 37.30 | 31.60 | 30.60 | 29.00 | 28.70 | 27.70 |
| 1981 | 27.20 | 27.20 | 27.00 | 25.70 | 25.70 | 24.50 | 24.40 | 24.30 | 23.90 | 24.10 | 24.10 | 24.00 |
| 1982 | 24.00 | 23.70 | 23.40 | 22.60 | 22.70 | 21.50 | 20.30 | | | | | |

## EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

| Country | per lb. $U_3O_8$ in Concentrates | per kg $U_3O_8$ in Concentrates | per kg U in Concentrates |
|---|---|---|---|
| US (dollar) | 18.25 | 40.23 | 47.45 |
| France (franc) | 124.91 | 275.39 | 324.75 |
| FRG (mark) | 45.04 | 99.29 | 117.09 |
| Japan (yen) | 4,704 | 10,370 | 12,228 |
| Switzerland (franc) | 38.32 | 84.49 | 99.63 |
| UK (pound) | 10.53 | 23.21 | 27.37 |
| Australia (dollar) | 18.29 | 40.32 | 47.55 |
| Canada (dollar) | 23.01 | 50.72 | 59.81 |
| Niger, Gabon (CFA) | 6,250 | 13,779 | 16,249 |
| South Africa (rand) | 20.88 | 46.03 | 54.29 |
| Sweden (kroner) | 110.87 | 244.44 | 288.25 |

[1]Calculated using currency exchange rates published in the Wall Street Journal on the last business day of the month.

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*STATISTICAL DATA*

**CONVERSION VALUE $1.00/lb. U as $UF_6$**
Determined as of July 31, 1982

**Definition**

The Conversion Value is Nuexco's judgment of the price at which spot and/or near term transactions for significant quantities of conversion services could be concluded in the secondary market as of the last day of the month.

**Derivation**

Nuexco bases the Conversion Value upon:
A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

**Comments**

Nuexco does not consider the following in determining the Conversion Value:
A. The price of conversion services delivered or to be delivered under old contracts.
B. The price of conversion services delivered in connection with contract renegotiations or other than arm's length transactions.

**LOAN USE CHARGE RATE[1] 6%**
Determined as of July 31, 1982

**Definition**

The Loan Use Charge Rate is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the last day of the month.

**Derivation**

Nuexco bases the Loan Use Charge Rate upon:
A. Data from recently completed or pending loan transactions.
B. Rates included in firm proposals to borrow or lend.
C. Rates that potential borrowers and lenders have expressed as a willingness to pay or accept, but for which Nuexco is not aware of firm proposals.

[1]Monthly data for 1968 through 1981 appear on pages 32-34 of Report 162.

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*STATISTICAL DATA*

## AUSTRALIAN GOVERNMENT STATISTICS

| | Price Index of Materials Used in Manufacturing Industry—All Groups (Year 1968-69 = 100.0)[1] | Weighted Average Minimum Weekly Wage Rates—Adult Males Australia Mining and Quarrying (A$)[2] |
|---|---|---|
| Annual Avg. 1971[3] | 101.5 | 65.95 |
| Annual Avg. 1972[3] | 105.6 | 71.26 |
| Annual Avg. 1973[3] | 124.4 | 78.96 |
| Annual Avg. 1974[3] | 141.9 | 108.07 |
| Annual Avg. 1975[3] | 150.4 | 132.55 |
| Annual Avg. 1976[3] | 168.4 | 160.93 |
| Annual Avg. 1977[3] | 192.0 | 179.03 |
| Annual Avg. 1978[3] | 198.5 | 190.04 |
| Annual Avg. 1979 | 248.8 | 196.34 |
| Annual Avg. 1980 | 321.8 | 218.00 |
| Annual Avg. 1981 | 355.3 | 237.27 |
| Feb 1981 | 356.6 | 230.41 |
| Mar 1981 | 355.2 | 229.66 |
| Apr 1981 | 354.6 | 229.38 |
| May 1981 | 353.4 | 237.31 |
| Jun 1981 | 360.4 | 237.93 |
| Jul 1981 | 356.9 | 237.86 |
| Aug 1981 | 359.9 | 237.86 |
| Sep 1981 | 357.4 | 237.82 |
| Oct 1981 | 351.6 | 239.26 |
| Nov 1981 | 351.3R | 241.13 |
| Dec 1981 | 349.9R | 258.05R |
| Jan 1982 | 354.9R | 260.05R |
| Feb 1982 | 356.7R | 259.68R |
| Mar 1982 | 360.3R | 259.85R |
| Apr 1982 | 368.2P | 259.38R |
| May 1982 | 368.1P | 260.06P |

P = Preliminary R = Revised since last month

[1]Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0), Table 3.
[2]Australian Bureau of Statistics, Canberra: "Wage Rates, Australia" (Catalogue No. 6312.0), Table 1. Figures for the latest fourteen months shown are subject to revision.
[3]Monthly data for 1970 through 1978 appear on pages 4.7 and 4.8 of Nuexco Report 138.

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*STATISTICAL DATA*

## CANADIAN GOVERNMENT STATISTICS

| | Industry Selling Price Index: Manufacturing (D 500000)[1] [2] (1971 = 100.0) | Wage-earner Data: Average Hourly Earnings (C$)[3] [4] | | |
|---|---|---|---|---|
| | | Metal Mining, including Milling (SIC 050-059) | Primary Metal Industries, non-ferrous (SIC 296-298) | Chemicals and Chemical Products (SIC 370-379) |
| Annual Avg. 1978 | 190.4 | 8.76 | 6.82 | 6.97 |
| Annual Avg. 1979 | 217.9 | 9.60 | 7.35 | 7.67 |
| Annual Avg. 1980 | 247.2 | 10.59 | 8.05 | 8.50 |
| Annual Avg. 1981 | 272.3P | 12.02 | 9.03 | 9.53 |
| May 1981 | 270.0 | 11.80 | 8.90 | 9.49 |
| Jun 1981 | 272.3 | 11.80 | 9.16 | 9.57 |
| Jul 1981 | 274.3 | 11.92 | 9.20 | 9.62 |
| Aug 1981 | 276.2 | 11.83 | 9.15 | 9.63 |
| Sep 1981 | 276.9 | 12.47 | 9.22 | 9.77 |
| Oct 1981 | 279.3 | 12.78 | 9.35 | 9.91 |
| Nov 1981 | 278.8 | 12.89 | 9.45 | 9.89 |
| Dec 1981 | 280.0 | 12.87 | 9.42 | 10.03 |
| Jan 1982 | 281.9 | 13.14R | 9.53 | 10.11 |
| Feb 1982 | 283.4R | 13.25 | 9.60 | 10.19 |
| Mar 1982 | 284.6R | 13.34P | 9.62P | 10.35P |
| Apr 1982 | 287.4R | 13.42P | 9.78P | 10.46P |
| May 1982 | 288.7R | — | — | — |
| Jun 1982 | 289.9P | — | — | — |

P = Preliminary R = Revised since last month

[1]Statistics Canada, Prices Division, Ottawa; "Industry Price Indexes" (Catalogue 62-011), Table 1. Indexes for the most recent six months shown are subject to revision.

[2]Monthly data for 1973 through 1978 appear on page 4.10 of Nuexco Report 138.

[3]Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours" (Catalogue 72-002), Table 2.

[4]Monthly data for 1977 and 1978 appear on page 4.11 of Nuexco Report 138.

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*STATISTICAL DATA*

## REPUBLIC OF SOUTH AFRICA STATISTICS

| | Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1] | Consumer Price Index[2] (1975 = 100, except where otherwise indicated) | Wholesale Price Index All Groups (1975 = 100) | Total Employment in Mining and Quarrying (Code 35)[5] | Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[5] |
|---|---|---|---|---|---|
| Annual Avg. 1971[3] | 7.88 | 106.4[4] | 59.1 | 652,294 | 415,956 |
| Annual Avg. 1972[3] | 8.79 | 113.3[4] | 63.9 | 623,067 | 443,933 |
| Annual Avg. 1973[3] | 10.51 | 124.1[4] | 72.3 | 684,743 | 572,133 |
| Annual Avg. 1974[3] | 13.18 | 138.5[4] | 85.3 | 674,140 | 761,596 |
| Annual Avg. 1975[3] | 16.71 | 157.2[4] | 100.0 | 639,473 | 1,003,617 |
| Annual Avg. 1976[3] | 19.30 | 174.7[4] | 115.1 | 671,240 | 1,212,983 |
| Annual Avg. 1977[3] [6] | 23.87 | 194.4[4] | 130.0 | 712,006 | 1,420,670 |
| Annual Avg. 1978[3] [6] | 27.14 | 137.2 | 142.7 | 664,571 | 1,537,169 |
| Annual Avg. 1979[3] [6] | 30.18 | 155.3 | 164.5 | 692,209 | 1,830,632 |
| Annual Avg. 1980[6] | 35.53 | 176.7 | 192.1 | 714,379 | 2,279,615 |
| Annual Avg. 1981 | 41.89 | 203.5 | 218.3 | 728,506 | 2,820,505 |
| Jan 1981 | — | 191.0 | 207.2 | 729,575 | 219,969 |
| Feb 1981 | — | 193.8 | 209.8 | 725,647 | 210,275 |
| Mar 1981 | 39.26 | 195.2 | 209.9 | 705,010 | 210,151 |
| Apr 1981 | — | 196.4 | 211.6 | 719,674 | 217,124 |
| May 1981 | — | 197.7 | 213.2 | 726,869 | 219,880 |
| Jun 1981 | 40.41 | 200.0 | 215.3 | 728,506 | 237,049 |
| Jul 1981 | — | 204.6 | 218.4 | 735,839 | 249,080 |
| Aug 1981 | — | 208.0 | 222.6 | 722,684 | 245,817 |
| Sep 1981 | 43.28 | 211.6 | 224.6 | 724,604 | 251,502 |
| Oct 1981 | — | 213.4 | 227.0 | 717,918 | 248,159 |
| Nov 1981 | — | 214.8 | 229.4 | 720,255 | 253,044 |
| Dec 1981 | 44.52 | 216.3 | 230.4 | 709,612 | 257,655 |
| Jan 1982 | — | 217.6 | 233.1 | 700,375 | 257,173 |
| Feb 1982 | — | 220.2 | 236.8 | 705,992 | 250,191 |
| Mar 1982 | 45.49 | 225.2 | 237.4 | — | — |
| Apr 1982 | — | 228.9 | 241.9 | — | — |
| May 1982 | — | 230.3 | 244.8 | — | — |

[1]Chamber of Mines of South Africa, Johannesburg; "Analysis of Working Results," published quarterly.
[2]Republic of South Africa Department of Statistics, Pretoria; "Government Gazette: Consumer Price Index for Urban Areas."
[3]Historical data for the Average Declared Working Costs and Consumer Price Index 1970-1979 appear on page 4.9 of Nuexco Report 140.
[4]April 1970 = 100.00.
[5]Bulletin of Statistics, Department of Statistics, Pretoria.
[6]Historical data for Codes 35 and 40 1977-1980 appear on page 28 of Nuexco Report 157.

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*STATISTICAL DATA*

## US GOVERNMENT STATISTICS

| | Producer Price Index—Industrial Commodities (1967 = 100)[1] | Producer Price Index—All Commodities (1967 = 100)[1] | Consumer Price Index (1967 = 100)[2] | GNP Implicit Price Deflator (1972 = 100)[3] | Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4] | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Metal Mining (SIC 10) | Primary Non-ferrous Metals (SIC 333) | Chemicals and Allied Products (SIC 28) | Electric and Electronic Equipment (SIC 36) |
| Annual Avg. 1971[5] | 114.1 | 114.0 | 121.3 | 96.02 | 4.12 | 4.15 | 3.97 | 3.49 |
| Annual Avg. 1972[5] | 117.9 | 119.1 | 125.3 | 100.00 | 4.56 | 4.59 | 4.26 | 3.71 |
| Annual Avg. 1973[5] | 125.9 | 134.7 | 133.1 | 105.80 | 4.84 | 4.98 | 4.51 | 3.91 |
| Annual Avg. 1974[5] | 153.8 | 160.1 | 147.7 | 116.02 | 5.44 | 5.63 | 4.88 | 4.21 |
| Annual Avg. 1975[5] | 171.5 | 174.9 | 161.2 | 127.15 | 6.13 | 6.24 | 5.39 | 4.64 |
| Annual Avg. 1976[5] | 182.4 | 183.0 | 170.5 | 133.71 | 6.76 | 6.87 | 5.91 | 4.96 |
| Annual Avg. 1977[5] | 195.1 | 194.2 | 181.5 | 141.70 | 7.28 | 7.67 | 6.43 | 5.39 |
| Annual Avg. 1978[5] | 209.4 | 209.3 | 195.4 | 152.05 | 8.23 | 8.56 | 7.02 | 5.82 |
| Annual Avg. 1979[5] | 236.5 | 235.6 | 217.4 | 165.46 | 9.27 | 9.50 | 7.60 | 6.32 |
| Annual Avg. 1980[5] | 274.8 | 268.8 | 246.8 | 177.36 | 10.27 | 10.63 | 8.30 | 6.95 |
| Annual Avg. 1981 | 304.1 | 293.4 | 272.4 | 193.71 | 11.55 | 11.98 | 9.12 | 7.62 |
| Jul 1981 | 306.2 | 296.0 | 274.4 | — | 11.60 | 12.21 | 9.16 | 7.65 |
| Aug 1981 | 307.2 | 296.2 | 276.5 | — | 11.84 | 12.10 | 9.19 | 7.73 |
| Sep 1981 | 307.4 | 295.7 | 279.3 | 195.61 | 12.10 | 12.70 | 9.38 | 7.75 |
| Oct 1981 | 309.0 | 296.1 | 279.9 | — | 12.08 | 12.44 | 9.37 | 7.80 |
| Nov 1981 | 309.3 | 295.9 | 280.7 | — | 12.12 | 12.48 | 9.42 | 7.83 |
| Dec 1981 | 310.0 | 295.8 | 281.5 | 200.10 | 12.08 | 12.45 | 9.53 | 7.90 |
| Jan 1982 | 311.8 | 298.3 | 282.5 | — | 12.19 | 12.66 | 9.68 | 7.98 |
| Feb 1982 | 311.6R | 298.6R | 283.4 | — | 12.22 | 12.61 | 9.68 | 7.96 |
| Mar 1982 | 311.0P | 297.9P | 283.1 | 203.68R | 12.29 | 12.69 | 9.71 | 8.01 |
| Apr 1982 | 309.9P | 297.9P | 284.3 | — | 12.23R | 12.68R | 9.81R | 8.03 |
| May 1982 | 309.5P | 298.6P | 287.1 | — | 12.23P | 12.68P | 9.82P | 8.06P |
| Jun 1982 | 310.7P | 299.4P | 290.6 | 206.35 | — | — | 9.95P | 8.09P |

P = Preliminary R = Revised since last month

[1]US Bureau of Labor Statistics, Washington, D.C.; "Producer Prices and Price Indexes," Table 6 (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents.

[2]US Bureau of Labor Statistics, Washington, D.C.; Consumer Price Index for All Urban Consumers, US City Average, All Items.

[3]US Department of Commerce, Washington, D.C.; Bureau of Economic Analysis, National Income and Wealth Division; "Survey of Current Business," Table A. The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted.

[4]US Bureau of Labor Statistics, Washington, D.C.; "Employment and Earnings," Table C-2. All data based on 1972 revision of SIC Manual. Data for 1970-1976 are adjusted to the March 1977 benchmark. Data for 1977-1978 are adjusted to the March 1979 benchmark. Data for January 1979 and beyond are adjusted to the March 1980 benchmark.

[5]Monthly data 1970-1978 for Producer Price Index-Industrial Commodities, Consumer Price Index, and Employment and Earnings SIC codes 10, 333, and 28, and quarterly data for GNP Implicit Price Deflator appear on pages 4.6-4.8 of Nuexco Report 139.
Monthly data 1977-1978 for Employment and Earnings SIC Codes 10, 333, and 28 appear on page 33 of Nuexco Report 147.
Monthly data 1970-1978 for Employment and Earnings SIC Code 36 appear on page 23 of Nuexco Report 154.
Monthly data 1979-1980 for Employment and Earnings, Revised Establishment Data, all listed codes, appear on page 22 of Nuexco Report 158.
Monthly data 1977-1980 for Producer Price Index-All Commodities, appear on page 21 of Nuexco Report 158.

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*FIGURES OF THE MONTH*

| | This Month | Last Month | 12 Months Ago |
|---|---|---|---|
| | (Referenced to July 31, 1982) | | |
| Exchange Value[1] | 18.25 | 19.25 | 23.50 |
| Transaction Value[1] | 20.30 | 21.50 | 24.40 |
| Conversion Value[2] | 1.00 | 1.00 | 1.15 |
| Loan Use Charge Rate[3] | 6% | 6% | 5½% |
| Near-Term Uranium Supply[4] | 2.6 | 17.8 | 5.4 |
| Near-Term Uranium Demand[5] | 1.0 | 1.1 | 1.4 |
| Near-Term Supply-Demand Ratio | 2.6 | 16.2 | 3.9 |
| Optimum Tails Assay[6] | .333 | .327 | .286 |
| Current Transactions[7]: | | | |
| Number of Transactions | 6 | 6 | 3 |
| Quantity of Material[8] | 1.9-3.9 | 0.4-1.2 | 0.5-1.2 |

[1]US $ per pound $U_3O_8$ equivalent
[2]US $ per pound U as $UF_6$
[3]Percent per annum
[4]Active inquiries to sell, for delivery within 12 months after contract signing (millions of pounds $U_3O_8$)
[5]Active inquiries to purchase, for delivery within 12 months after contract signing (millions of pounds $U_3O_8$)
[6]Percent $U_{235}$
[7]Uranium transactions only; does not include loans or conversion transactions
[8]Millions of pounds $U_3O_8$, equivalent

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## OPTIMUM TAILS ASSAY

The optimum tails assay is the tails composition at which the cost of enriched uranium is lowest for given costs of separative work (SWU) and natural uranium feed. It depends only on the ratio of the cost of a kilogram of natural uranium in the form of $UF_6$ to the cost of a kilogram unit of separative work. Holders of US Department of Energy (USDOE) Adjustable Fixed Commitment (AFC) enrichment contracts have the option to specify, within limits, the transaction tails assay. The transaction tails assay for USDOE Requirements contracts is 0.2 percent $U_{235}$. For every one-hundredth of one percent increase in the transaction tails assay, natural uranium consumption increases about two percent.

[1]Based on Exchange Value and USDOE 1980 AFC SWU price; interpolated to the nearest thousandth.

## STANDARD ABBREVIATIONS

| | |
|---|---|
| ACTU: | Australian Council of Trade Unions |
| AEB: | Atomic Energy Board (South Africa) |
| AEC: | Atomic Energy Commission (US) (predecessor of NRC and DOE) |
| AECB: | Atomic Energy Control Board (Canada) |
| AFC: | Adjustable fixed commitment (swu contract) |
| AFR: | Away from reactor |
| AFUDC: | Allowance for Funds Used During Construction |
| AGR: | advanced gas-cooled reactor |
| BLWR: | same as BWR |
| BNFL: | British Nuclear Fuels, Ltd. (UK) |
| BWR: | boiling water reactor |
| CEA: | Commissariat a l'Energie Atomique (France) |
| CEGB: | Central Electricity Generating Board (UK) |
| CNEA: | Comision National de la Energia Atomica (Argentina) |
| COMINAK: | Compagnie des Mines d'Akouta (Republic of Niger) |
| DOE: | Department of Energy (US) |
| EEC: | European Economic Community |
| EIA: | Energy Information Agency (US) |
| EMR: | Department of Energy Mines & Resources (Canada) |
| ENEL: | Ente Nationale per l'Energie Elettrica |
| ENUSA: | Empresa Nacional del Uranio S.A. (Spain) |
| ERA: | Energy Resources of Australia |
| ESCOM: | Electricity Supply Commission (South Africa) |
| EdF: | Electricite de France |
| FBFC: | Societe Franco-Belge de Fabrications de Combustibles |
| FBR: | Fast breeder reactor |
| FRG: | Federal Republic of Germany |
| GCHWR: | gas-cooled heavy-water moderated reactor |
| GCR: | gas-cooled reactor |
| GNP: | Gross National Product |
| HTGR: | high-temperature gas-cooled reactor |
| HWLWR: | heavy water moderated boiling light-water-cooled reactor |
| IAEA: | International Atomic Energy Agency |
| INFCE: | International Nuclear Fuel Cycle Evaluation |
| JAURD: | Japan-Australia Uranium Resource Development Co. |
| JEN: | Junta de Energia Nuclear (Spain) |
| LGR: | light-water cooled graphite-moderated reactor |
| LMFBR: | liquid metal fast breeder reactor |
| LTFC: | Long-term fixed commitment (swu contract) |
| LWBR: | light-water breeder reactor |
| LWCHW: | light-water-cooled heavy-water-moderated reactor |
| MITI: | Ministry of International Trade and Industry (Japan) |
| MMN: | Metallurgie et Mecanique Nucleaires |
| MWe: | Megawatts of electricity |
| NAPOCOR: | National Power Corporation (Philippines) |
| NNPA: | Nuclear Non-proliferation Act (US) |
| NPT: | Treaty on Non-Proliferation of Nuclear Weapons |
| NRC: | Nuclear Regulatory Commission (US) |
| NSSS: | Nuclear Steam Supply System |
| NUFCOR: | Nuclear Fuels Corporation of South Africa Ltd. |
| OURD: | Overseas Uranium Resources Development Co., Ltd. |
| PHWR: | pressurized heavy-water-moderated and cooled reactor |
| PNC: | Power Reactor and Nuclear Fuel Development Corporation (Japan) |
| PSC: | Public Service Commission |
| PUC: | Public Utility Commission (US) |
| PWR: | pressurized water reactor |
| RAR: | Reasonably assured resources |
| RTZ: | Rio Tinto-Zinc Corporation Ltd. (UK) |
| SMDC: | Saskatchewan Mining Development Corporation (Canada) |
| SOMAIR: | Societe des Mines de l'Air |
| SSPB: | Swedish State Power Board |
| SWU: | Separative Work Unit |
| THTR: | thorium high-temperature reactor |
| TMI: | Three Mile Island (US) |
| TVA: | Tennessee Valley Authority (US) |
| UEGA: | Uranium Enrichment Group of Australia |
| UK: | United Kingdom |
| URDC: | Uranium Resources Development Corp. (Japan) |
| USBLS: | United States Bureau of Labor Statistics |
| VTAO: | Variable tails option (swu contract) |
| WOCA: | World outside communist areas |
| FIFO: | First in, First out |
| LIFO: | Last in, First out |

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# NUEXCO REPORT 168
# EXECUTIVE SUMMARY

**Exchange Value Drops $1.00, to $18.25**

The **Exchange Value** as of July 31, 1982 is $18.25 per pound $U_3O_8$. Sellers continued their vigorous competition for the limited business available in the current market.

**Near-Term Supply Decreases Sharply and Near-Term Demand Declines Slightly**

*Active* sellers in the zero to one year time frame are offering 2.6 million pounds $U_3O_8$, down 15.2 million pounds from last month. *Active* uranium demand in the zero to one year time frame decreased slightly, to 1.0 million pounds $U_3O_8$.

**Supply-Demand Imbalance Continued, but Severity Diminished**

Consequently, the ratio of near-term supply to near-term demand decreased dramatically from 16.2:1 last month to 2.6:1 this month.

**Transaction Value Declined $1.20, to $20.30**

The **Transaction Value** as of July 31, 1982 is $20.30 per pound $U_3O_8$. It includes ten transactions totaling 2.2 million pounds $U_3O_8$ and covers a period of four months.

**Six Uranium Sales Reported**

Six uranium sales are reported this month. The total quantity falls in the range of 1.9 million to 3.9 million pounds $U_3O_8$.

**Conversion Value Unchanged at $1.00**

The **Conversion Value** as of July 31, 1982 is $1.00 per pound U as $UF_6$, unchanged from last month. No conversion transactions are reported. Active sellers are offering 2.8 million pounds U in near-term conversion services, while active demand amounts to only 650 thousand pounds U in near-term conversion services.

**South Africa**

Uranium production in the second quarter of 1982 amounted to 3.6 million pounds $U_3O_8$, up 2 percent from the first quarter.

**Australia**

Labor Party softens opposition to uranium mining.

**United States**

Marline Uranium finds 30 million pound deposit in Virginia.

Full power license for San Onofre Unit 2.

Impact of forecast reactor cancellations is assessed.

**Market Analysis**

Nuexco estimates of uranium production and consumption are presented for the period 1970-1980.

**Raw Materials**

Rising production costs and declining market prices have combined to reduce Nuexco's estimate of Free World reasonably assured resources from approximately 1,450,000 tonnes $U_3O_8$ in July, 1981 to 636,000 tonnes $U_3O_8$ as of this Report.

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